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APPENDIX I

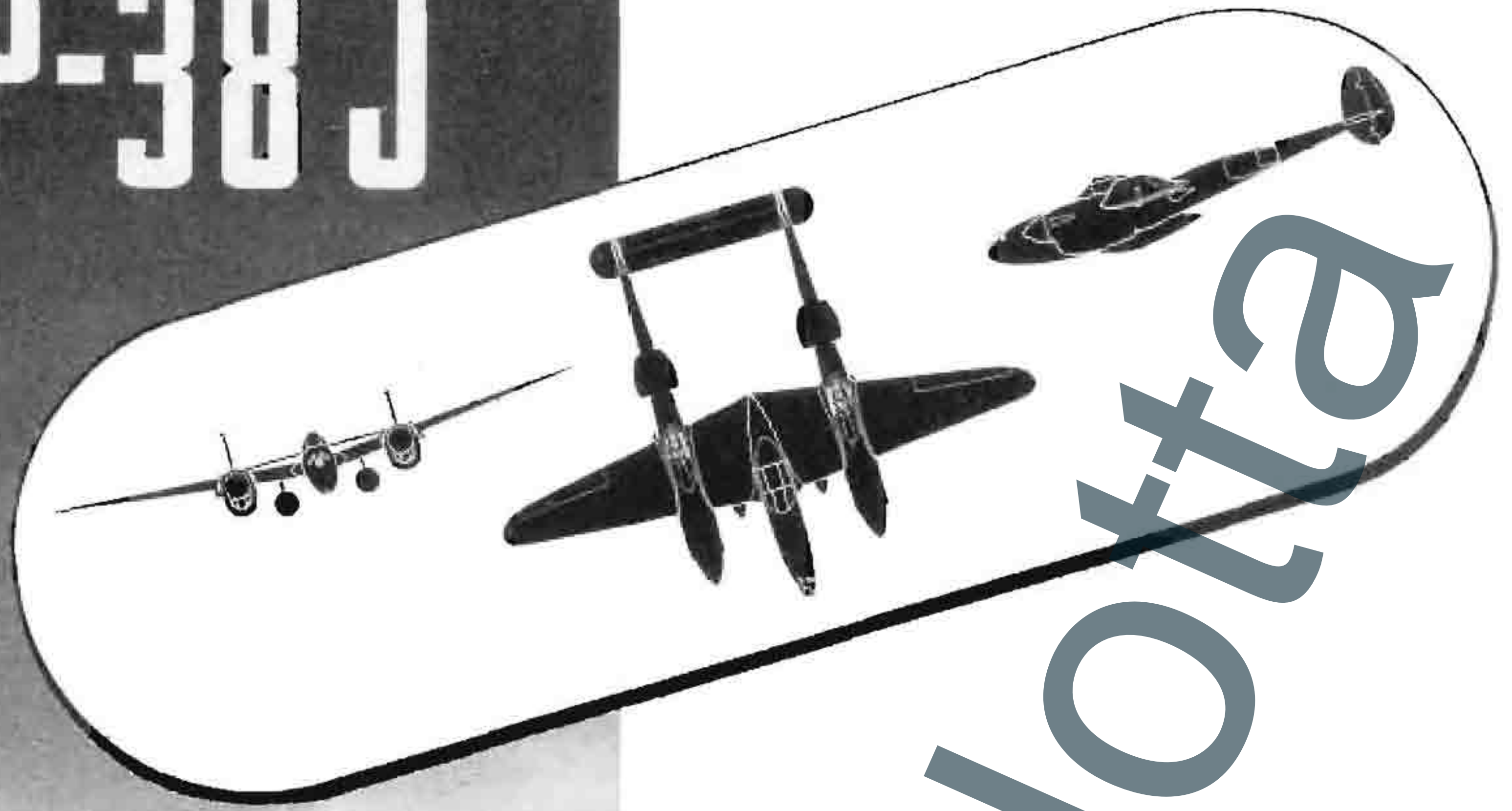
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P-38J



P-38H



F-5B IS SIMILAR TO
P-38J EXCEPT NO GUNS
ARE INSTALLED

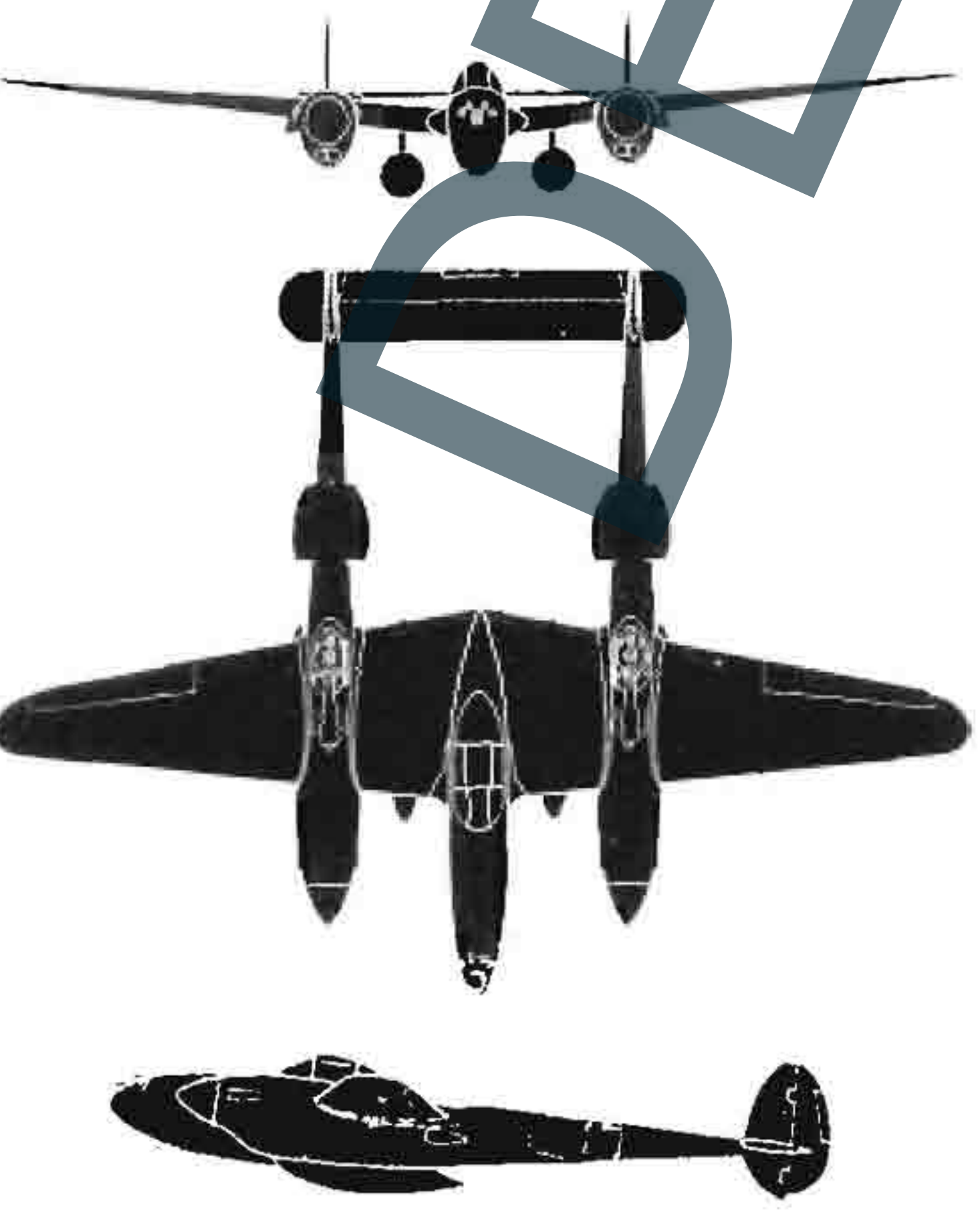


Figure 1 — The Airplane

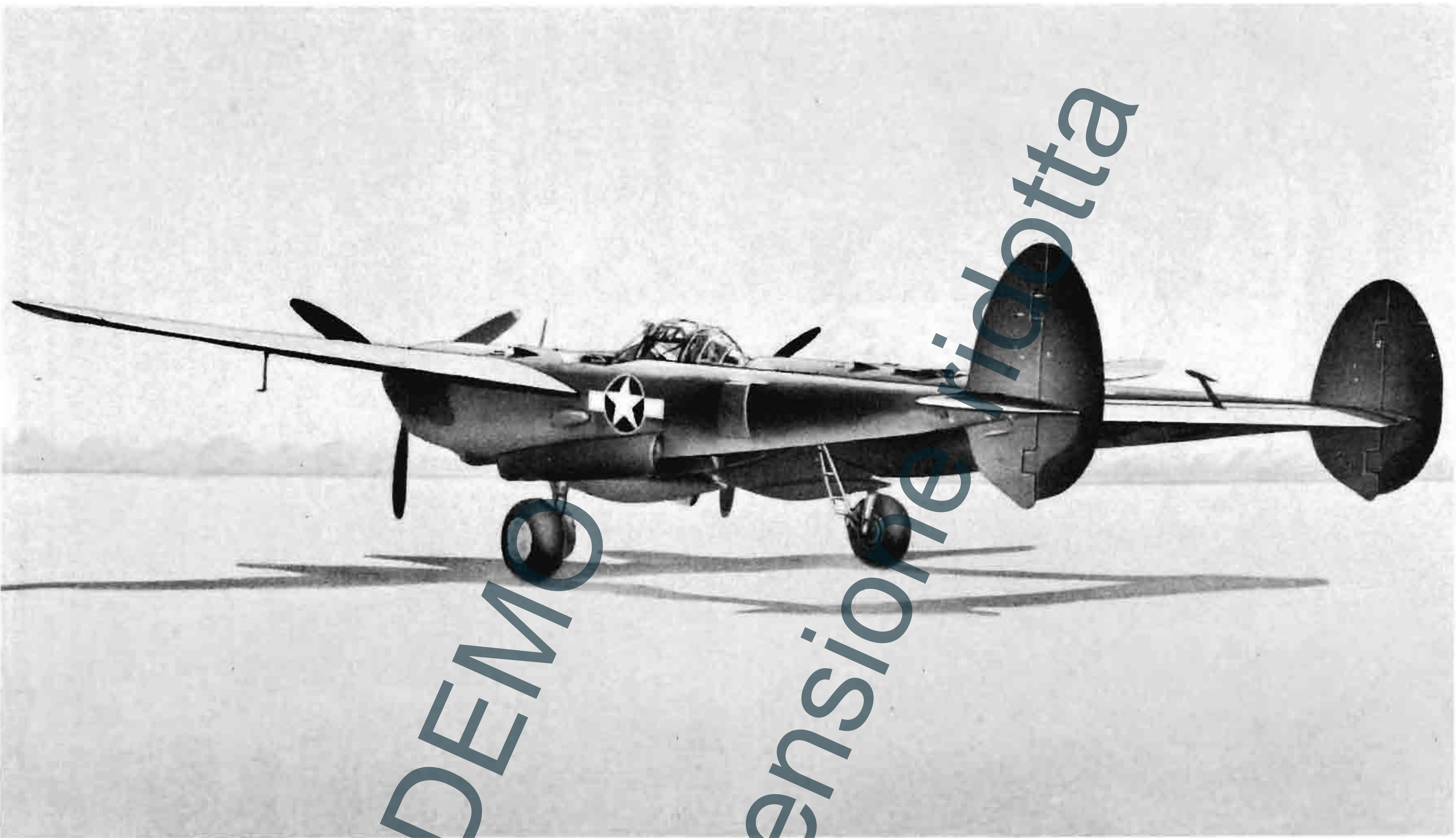
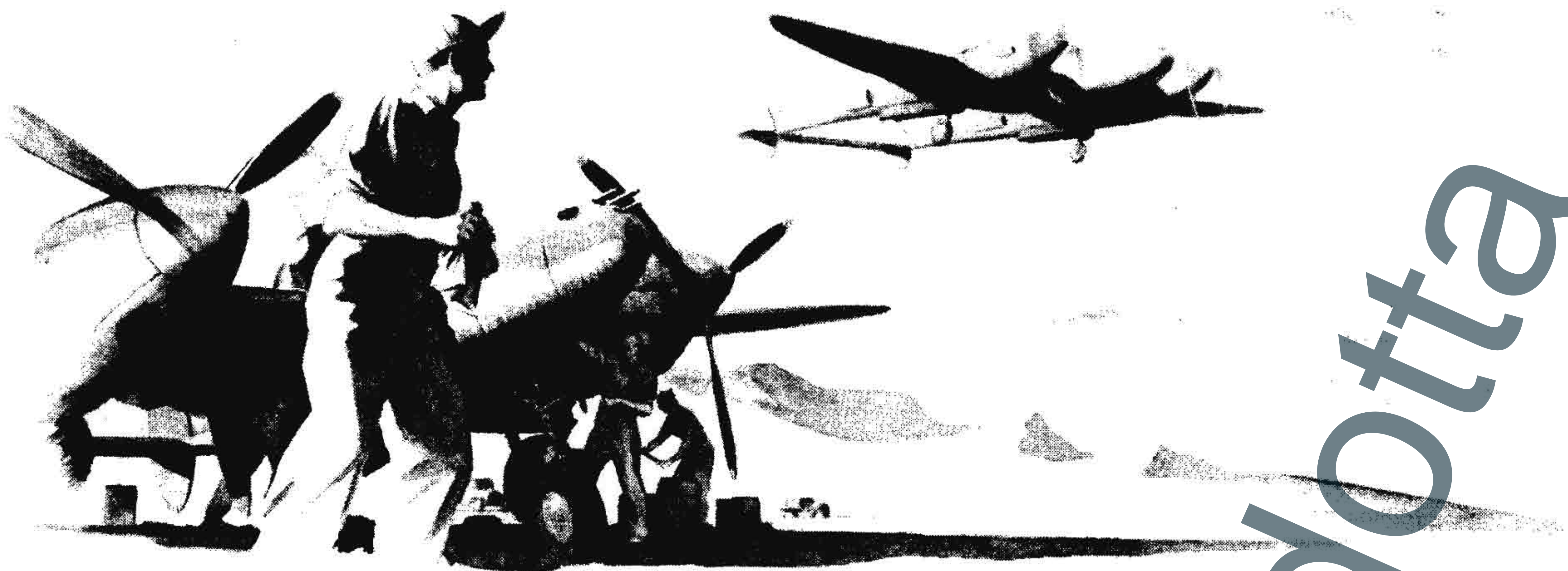


Figure 2—Three-Quarter Rear View of Complete Airplane



SECTION I

Description

1. GENERAL.

a. The P-38H, P-38J and F-5B airplanes are twin boomed, single seater, monoplanes manufactured by the Lockheed Aircraft Corporation and are powered by one V-1710-89 (right hand rotating) and one V-1710-91 (left hand rotating) Allison engine. P-38H and P-38J are fighter airplanes. The F-5B is a photographic airplane. The engines drive three bladed, constant speed, full feathering, Curtiss electric propellers. Hydraulically operated landing gear, flaps, brakes, and coolant shutters are provided. The approximate overall dimensions are as follows:

Length	37 feet 10 inches
Height	9 feet 9 ³ / ₄ inches
Span	52 feet 0 inches

b. FUEL, OIL, AND COOLANT.

Fuel.....Specification AN-VV-F-781 (Amendment No. 5 or better) (Octane 100)

Oil.....Specification AN-VV-O-446A (Grade 1120) (for cold weather operation, use grade 1100A, with oil dilution, if necessary).

Coolant.....Specification AN-E-2 (Ethylene Glycol)

c. The armament is mounted in the nose of the fuselage and armor protection is provided as shown in figure 3. Photographic airplanes are protected by armor

the same as the fighters but all armament is replaced by cameras.

2. ENGINE AND PROPELLER CONTROL.

a. THROTTLE AND SUPERCHARGER CONTROL.

(1) The throttle is mechanically connected to the supercharger regulator so that control of the supercharger as a separate operation has been eliminated.

(2) Operation of the throttle control (figure 4-2) is the same as a conventional throttle except that the engine response is sluggish in the 2/3 to WIDE OPEN range. This sluggish response is due to the time required for the superchargers to reach their new speed.

b. MIXTURE CONTROLS.

(1) The mixture controls (figure 4-6) have four positions, FULL RICH, AUTO RICH, AUTO LEAN and CUTOFF. Operate as indicated in Section II and in the cruising charts in Appendix II.

c. PROPELLER CONTROLS.—Conventional electric propeller controls are installed.

(1) PROPELLER PITCH CONTROL LEVERS (figure 4-4) select the desired engine rpm for automatic constant speed propeller operation.

(2) PROPELLER SELECTOR SWITCHES (figure 4-5) have four positions.

(a) AUTO CONSTANT SPEED.—The propeller governors are in operation and engine speed will be maintained as set on the propeller pitch levers (figure 4-4.)

(b) FIXED PITCH.—Propeller pitch is fixed, engine speed depends upon power and airplane speed.

(c) INC RPM.—Propeller pitch decreases, engine speed increases.

(d) DEC RPM.—Propeller pitch increases, engine speed decreases.

(3) PROPELLER CIRCUIT BREAKERS.—Open, and the propeller pitch changing mechanism is inoperative, when the current required to operate the propellers becomes too high. When the circuit breakers open, the buttons (figure 4-9) pop up disclosing a red and white band on the buttons. They may be reset by pushing the buttons after allowing approximately 15 seconds for the switches to cool. Only the black portion of the buttons is visible when the circuit breakers are properly set.

(4) FEATHERING SWITCHES (figure 4-13) turn the propellers to their minimum drag position.

(5) WARNING LIGHTS (figure 4-7) are installed on P-38H only. They indicate when the propeller circuits are not properly set for take-off and landing, (i.e.) when the circuit breakers are open, or the selector switches are not set to AUTO CONSTANT SPEED. These lights, however, do not warn of an improperly set propeller pitch control.

(6) VERNIER KNOB (figure 4-18) provides for fine adjustment of the right-hand propeller pitch control when synchronizing the engines.

(7) FRICTION CONTROL (figure 4-19) may be adjusted to prevent the throttles and propeller pitch controls from vibrating out of position.

d. CARBURETOR AIR FILTER CONTROLS.

(1) This control is located behind the pilot seat on early airplanes. On airplanes serial 42-67702 and up, this control is located on the engine control stand (figure 4-8). The filters are to be used whenever dusty air conditions dictate, but since they reduce the critical altitude of the engines and reduce the maximum range obtainable, they should be used only when necessary.

e. COOLANT TEMPERATURE CONTROLS.

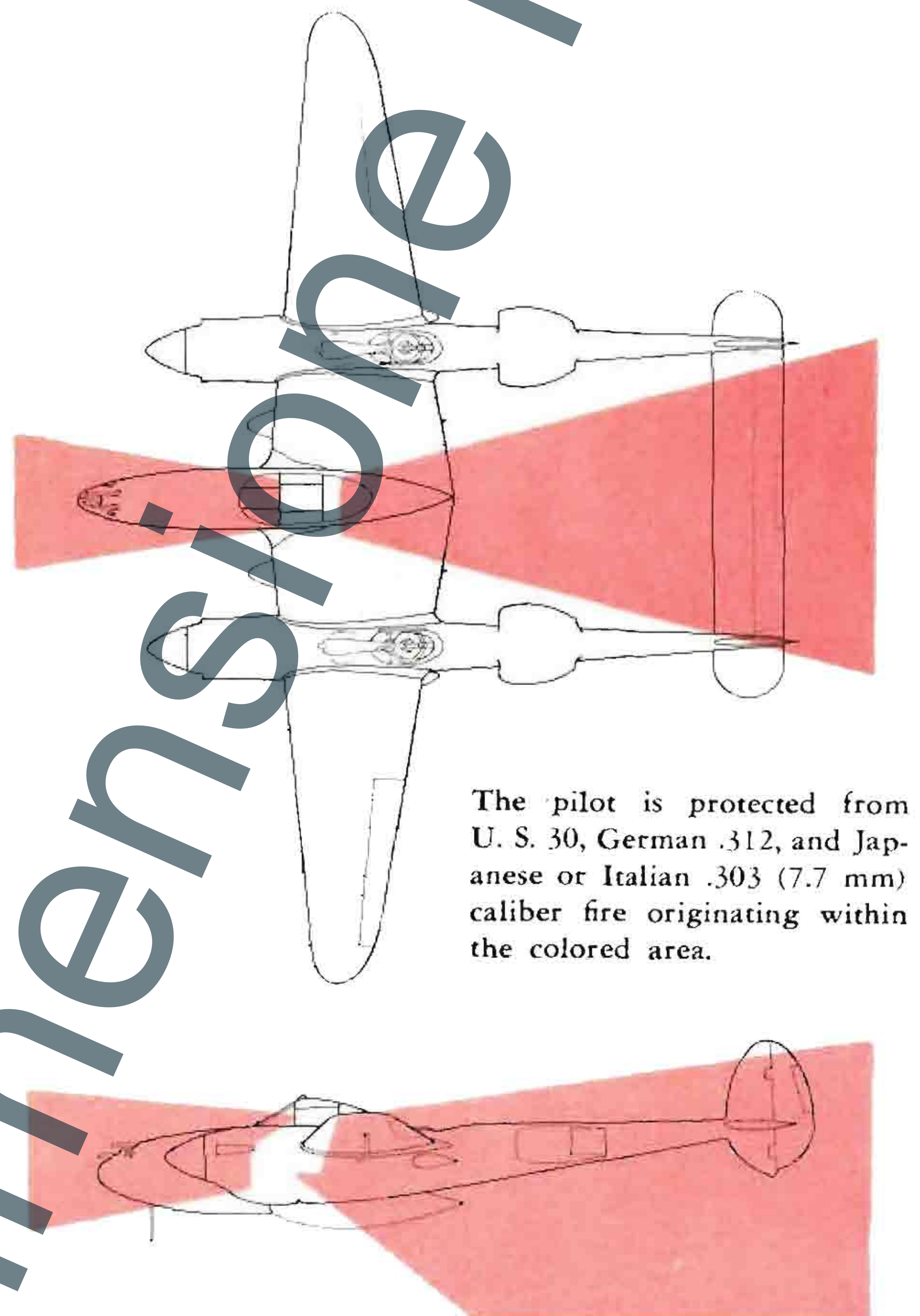
(1) Coolant temperature is automatically regulated between 101° C (flaps closed) and 121° C (flaps open) (214 to 250° F) with the coolant flap override switches set to OFF.

(2) The override switches (figure 6-13) may be operated to fully OPEN or fully CLOSE the flaps in the event that the regulators fail to maintain the above temperatures. It is not possible to set the coolant flap to any position except full OPEN or full CLOSE when using the override switches. If hydraulic pressure fails completely, the flaps will assume a faired (mid) position.

f. OIL TEMPERATURE CONTROLS.

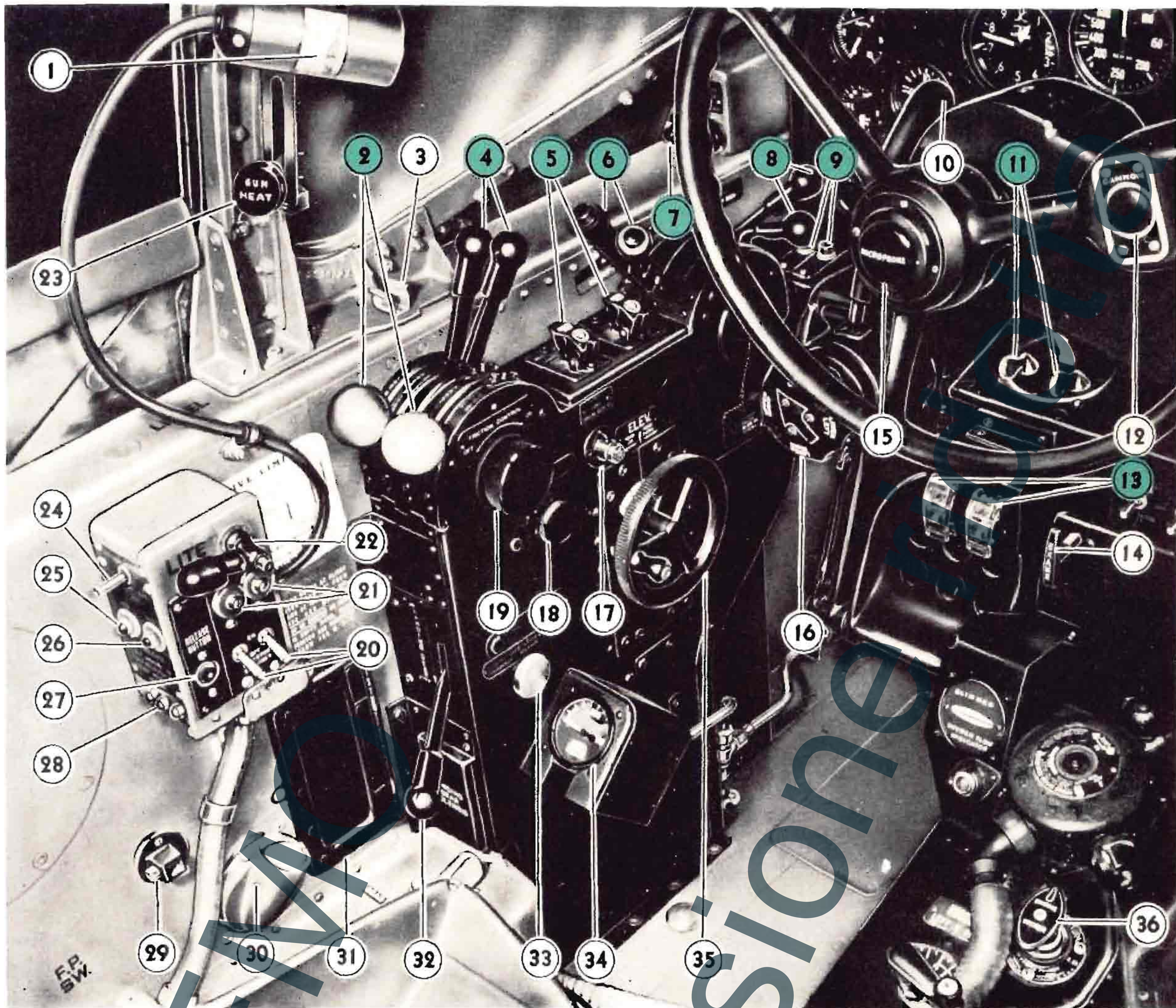
(1) Oil temperature is automatically regulated between 75° C (flaps closed) and 95° C (flaps open) (167° to 203° F) with the oil cooler flap switches (figure 6-17) set to AUTOMATIC.

(2) The oil cooler flap switches have four positions, AUTOMATIC, OFF, OPEN, and CLOSE. They may be operated to place and hold the flaps in any position in the event the regulators fail to maintain the above temperatures.



The pilot is protected from U. S. .30, German .312, and Japanese or Italian .303 (7.7 mm) caliber fire originating within the colored area.

Figure 3 — Armor Protection



- | | | |
|--|---|--|
| 1. Spotlight (normal position). | 13. Propeller feathering switches. | 24. Arm-safe switch. |
| 2. Throttles. | 14. Parking brake handle. | 25. Arming indicator light. |
| 3. Surface controls lock clip. | 15. Microphone button (under left thumb on P-38J and F-5B). | 26. Safe indicator light. |
| 4. Propeller pitch controls. | 16. Gun charging selector knob. | 27. Bomb or tank release button. |
| 5. Propeller selector switches. | 17. Landing gear warning light. | 28. Spare indicator lights. |
| 6. Mixture controls. | 18. Propeller pitch vernier knob. | 29. Spotlight alternate position socket. |
| 7. Propeller warning lights (P-38H only) | 19. Friction control. | 30. Cockpit ventilator control. |
| 8. Carburetor air filter control (airplane 42-67702 and up) (control not used on earlier airplanes). | 20. Bomb or tank selector switches. | 31. Gun sight dark glass stowage. |
| 9. Propeller circuit breaker buttons. | 21. Bomb or tank indicator lights. | 32. Landing gear control handle. |
| 10. Gun charger handle. | 22. Cockpit light. | 33. Landing gear control release. |
| 11. Ignition switches. | 23. Gun (or camera) compartment heat control. | 34. Oxygen pressure gage. |
| 12. Cannon trigger button. (Machine gun button on forward side of wheel.) | | 35. Elevator tab control. |
| | | 36. Engine primer. |

Figure 4 — Cockpit, Left-hand Side

3. FUEL SYSTEM.

(See figure 9.)

a. Fuel pressure (figure 7-4), normally 14 to 18 lb/sq in., is supplied by one engine driven pump and one electric pump for each engine. The electric pumps (figure 10-4) should be turned ON during take-off and landing, and at altitude (usually above 12000 feet) if the fuel pressure drops below 14 lb/sq in.

b. FUEL QUANTITY GAGES (figure 7-16) indicate for the four wing tanks only. The quantity in the droppable tanks must be estimated from the time of flight and the hourly fuel consumption as indicated in the charts in Appendix II.

4. OIL SYSTEM.

(See figure 15.)

5. RETRACTABLE LANDING GEAR CONTROL.

(See figure 13.)

a. The landing gear lever (figure 4-32) controls the extension and retraction of all three wheels. A lock on the lever prevents its being moved out of the DOWN position when the airplane is on the ground (when the left main shock strut is compressed). If this lock fails, or if it is necessary to retract the gear on the ground due to engine failure at take-off, it may be released by rotating the landing gear control release knob (figure 4-33) in a counter-clockwise direction. The landing gear position is indicated on the instrument panel (figure 7-19). A warning horn and light (figure 4-17) are provided which operate when either throttle is closed if the gear is not down and locked. P-38J and F-5B airplanes are not equipped with the warning horn.

6. FLAP CONTROL.

(See figure 13.)

a. Flap action is controlled by the lever (figure 5-2) on the right-hand side of the cockpit, and flap position is indicated on the instrument panel (figure 7-19). When the lever is placed to UP or DOWN, the flaps will auto-

matically stop at their end position. The lever should be returned to CLOSED as soon as the end position is reached. The control will not go to the down position until the trigger on the lever is lifted through the notch just forward of the closed position.

NOTE

When using maneuvering flaps, the flap lever must be left in the maneuver position. If it is moved even slightly forward and then returned to maneuver the flaps will extend completely. This condition is corrected on airplanes 42-66750 and up.

7. HYDRAULIC SYSTEM.

(See figure 11.)

a. Normal system pressure (figure 7-11) is between 1200 and 1350 lb/sq in. See Section IV, paragraph 1, for emergency operation in case of failure of the system.

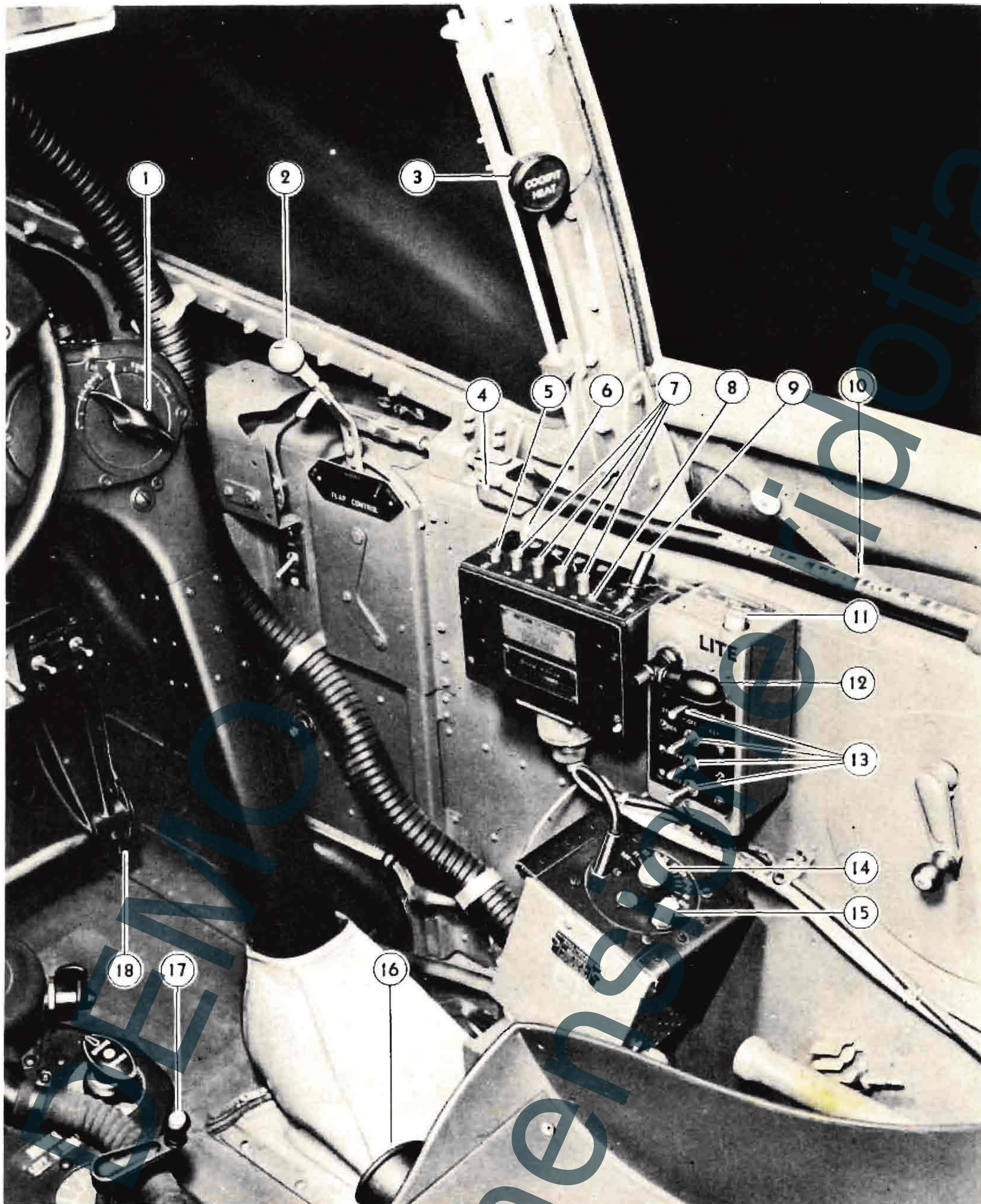
b. There are three separate systems of operation for the hydraulic equipment in this airplane.

(1) The normal system operates all the hydraulic equipment (except brakes) using power from the engine driven pumps and fluid from the TOP half of the main hydraulic reservoir.

(2) The auxiliary system operates the same equipment and uses the same lines as the normal system. It functions exactly like the normal system except the hand hydraulic pump furnishes the power and the fluid comes from the BOTTOM of the main hydraulic reservoir. When using the auxiliary system the hand pump source selector valve (figure 14-4) is UP and the bypass valve (figure 14-3) is OPEN.

NOTE

It will be impossible to build up pressure with the hand pump unless the coolant override switches are OFF. This is due to a fixed bleed in the system when the switches are in the override position.

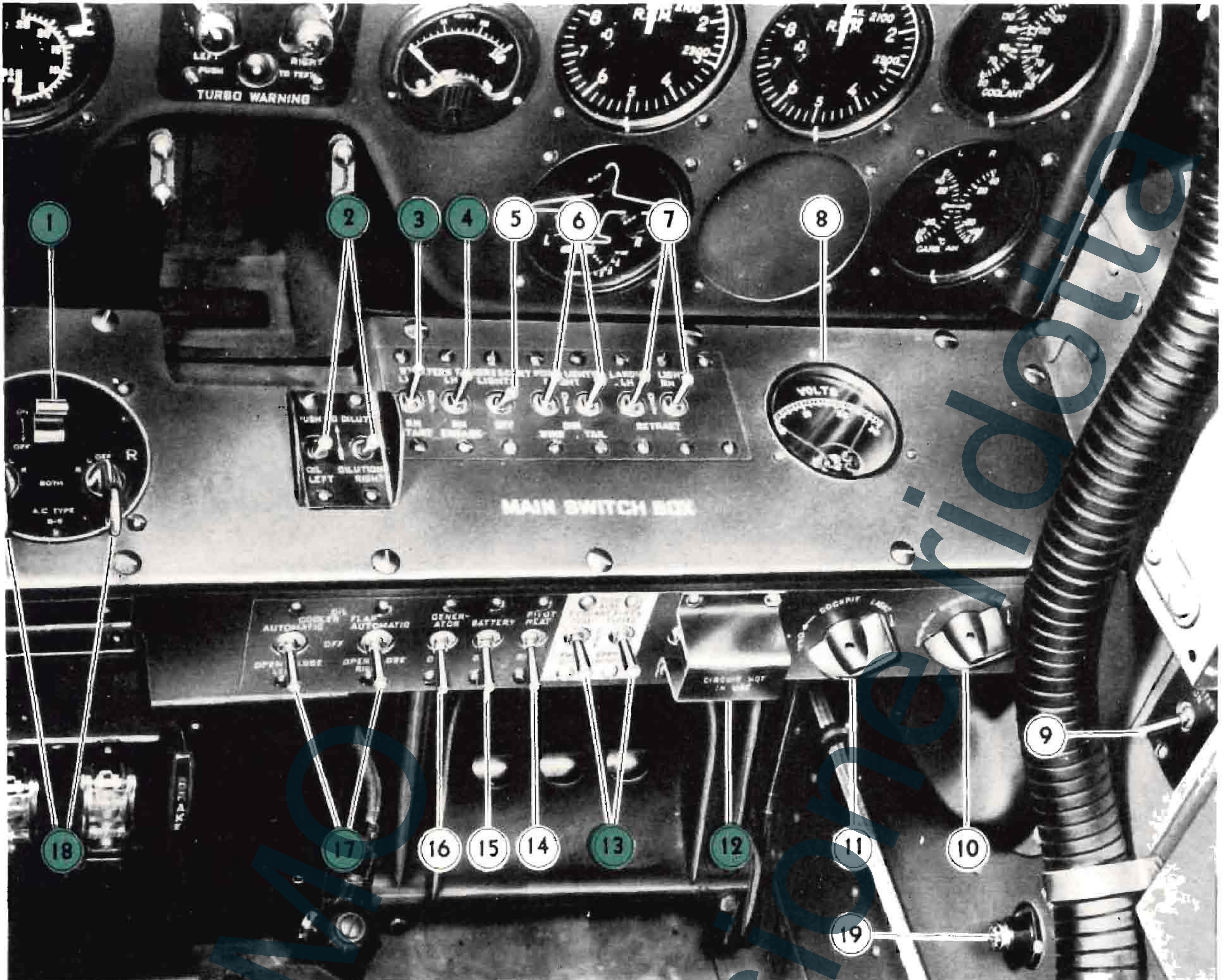


1. Aileron tab control.
2. Flap control lever.
3. Cockpit heat control.
4. Surface controls lock guide angle.
5. Radio OFF push button.
6. Indicator light dimming lever.

7. Frequency selector push buttons.
8. Selector lock lever.
9. Selector switch.
10. Surface controls lock (stowed).
11. Recognition light keying switch.
12. Cockpit light.

13. Recognition light switches.
14. Detrola receiver tuning knob.
15. Detrola receiver volume control.
16. Pilot's relief tube.
17. Rudder trim tab control.
18. Rudder pedal adjustment lever.

Figure 5 — Cockpit, Right-hand Side



- | | |
|--|---|
| 1. Ignition master switch. | 11. Cockpit light rheostat. |
| 2. Oil dilution switches. | 12. Intercooler flap switches. (P-38J and F-5B)
Circuit not in use on P-38H. |
| 3. Starter switch. | 13. Coolant flap override switches. |
| 4. Engage switch. | 14. Pitot heat switch. |
| 5. Fluorescent light switch. | 15. Battery switch. |
| 6. Position light switches. | 16. Generator switch. |
| 7. Landing light switches (left-hand
only on P-38J and F-5B). | 17. Oil cooler flap switches. |
| 8. Voltmeter. | 18. Ignition switch. |
| 9. Inverter switch (P-38H). | 19. Inverter warning light (P-38H). |
| 10. Gun sight light rheostat. | |

Figure 6 — Main Switch Box

(3) The emergency system operates from a separate reservoir and through separate lines using the hand pump for power. THE ONLY PURPOSE OF THIS SYSTEM IS TO EXTEND THE LANDING GEAR IN CASE OF COMPLETE FAILURE OF THE OTHER TWO SYSTEMS. When using the emergency system the hand pump source selector valve (figure 14-4) is DOWN and the bypass valve (figure 14-3) is CLOSED. (Later airplanes have the bypass valve incorporated in the source selector valve.)

c. Brakes are not connected to the main hydraulic system. No emergency braking system is provided. See figure 12 for brake system diagram.

8. HEATING AND VENTILATION.

(See figure 18.)

a. COCKPIT HEAT is supplied by an intensifier tube in the right engine exhaust and controlled by a knob (figure 5-3) on the right windshield support. Heat outlets are arranged to supply warm air to the windshield and removable hatch. The foot heat outlet may be closed off by operating the heat control (figure 18-5) on the floor under the right foot.

b. VENTILATING AIR enters from the left wing-fuselage fillet. The rate of flow may be varied by rotating the ventilator (figure 4-30) as desired.

c. ARMAMENT OR CAMERA COMPARTMENT HEAT is supplied by an intensifier tube in the left engine exhaust. The heat control (figure 4-23) on the left windshield support is used to turn the heat on and off.

9. ELECTRICAL SYSTEM.

a. The 24 volt electrical system is powered by a generator on the left engine and a battery in the left boom. (F-5B camera airplanes have a generator on each engine, controlled by separate switches located near the ammeters, and a battery in the nose compartment.) The battery switch (figure 6-15) cuts out the battery, leaving the rest of the system operating on the generator. The generator switch (figure 6-16) cuts out the generator, allowing the system to draw from the battery only. The ignition master switch (figure 6-1) has no effect upon the electrical system, but cuts out the ignition to both engines.

b. LIGHTS.

(1) LANDING LIGHT is located under the left wing (both wings on P-38H) and controlled by switch(es) (figure 6-7) on the main switch box. With

the switch(es) ON the lights extend and turn on. On P-38H airplanes with the switches OFF the lights turn off, but remain extended. On P-38J and F-5B airplanes with the switch OFF the lights remain ON and the lights remain extended. Never fly above 140 MPH unless the landing light switches are in the RETRACT position.

(2) RECOGNITION LIGHTS. — One or two (white) upward and three (red, green and amber) downward lights are controlled by switches on the right-hand side of the cockpit. To operate turn the selector switches (figure 5-13) to STEADY, or turn the selector switches to KEY and press the keying switch button (figure 5-11).

CAUTION

It is possible to burn the plastic lenses of the downward recognition lights by operating them for more than thirty seconds while on the ground. Make all ground operation as short as possible.

(3) POSITION LIGHTS are controlled by switches (figure 6-6) on the main switch box. Bright, dim and off positions are provided.

(4) COCKPIT LIGHTS (figures 5-12 and 4-22) are controlled by a rheostat (figure 6-11) on the main switch box and a switch on the lights themselves.

(5) FLUORESCENT INSTRUMENT LIGHTS are mounted on the forward side of the control column and turned on by a switch (figure 6-5) on the main switch box. Light intensity is regulated by twisting the ends of the lighting unit.

(6) SPOTLIGHT (figure 4-1) is normally on the left windshield support. An alternate position (figure 10-1) is provided over the fuel tank selector valves. The spotlight switches are located on the light, and the beam may be focused by sliding the screw head forward and aft in its slot.

c. INVERTER.—On P-38H airplanes the inverter is turned on by the switch (figure 6-9) under the flap lever. It supplies 400 cycle alternating current which is used to operate the fluorescent lights and the remote indicating compass. A warning light (figure 6-19) glows when the inverter is not operating. The operation of this light indicates failure of the inverter and consequent failure of the compass and fluorescent lights.

(1) On P-38J and F-5B airplanes the inverter operates only the compass and is turned on by a switch on the main switch box labeled COMPASS; ON-OFF. No warning light is installed.

10. PILOT COMFORT.

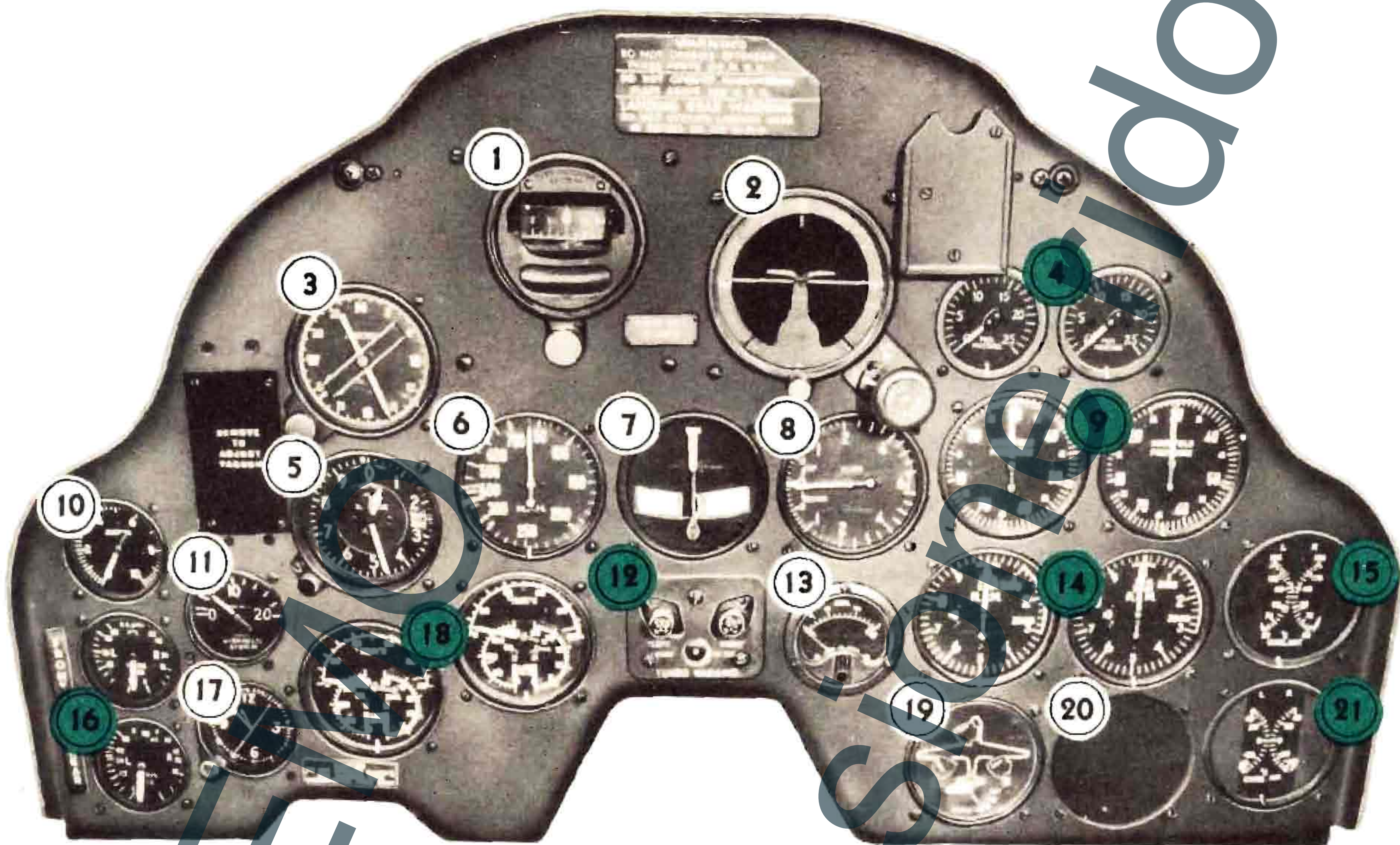
a. **RUDDER PEDAL ADJUSTMENT** is obtained by pushing or pulling the small lever (figure 5-18) on the outboard corner of each pedal and moving the pedals to suit. Care must be taken to insure that both pedals are adjusted equally.

b. **SEAT ADJUSTMENT** is obtained by lifting the small lever (figure 14-1) on the right side of the seat and raising or lowering the seat as required. Release the

lever and make sure that the seat is firmly locked in the new position. Normally the seat will be adjusted to the height which will make the reflection of the gun sight light easily visible.

c. **SHOULDER HARNESS** should be worn at all times. It will be impossible to lean forward unless the harness lever (figure 10-6) on the left side of the pilot's seat is raised. The harness lock will re-engage as soon as an upright position is resumed.

d. **PILOT'S RELIEF TUBE** (figure 5-16).



1. Directional gyro.
2. Gyro horizon.
3. Compass indicator.
4. Fuel pressure gages.
5. Altimeter.
6. Airspeed indicator.
7. Turn and bank indicator.
8. Rate of climb indicator.
9. Manifold pressure gages.
10. Suction gage.
11. Hydraulic pressure gage.
12. Turbo overspeed warning lights.
13. Ammeter.
14. Tachometers.
15. Coolant temperature indicator.
16. Fuel quantity gages.
17. Clock.
18. Combination oil pressure and temperature gages (fuel pressure indicator not connected).
19. Flap and landing gear position indicator.
20. Space for BC-608 Contactor.
21. Carburetor air temperature indicator.

Figure 7 — Instrument Panel

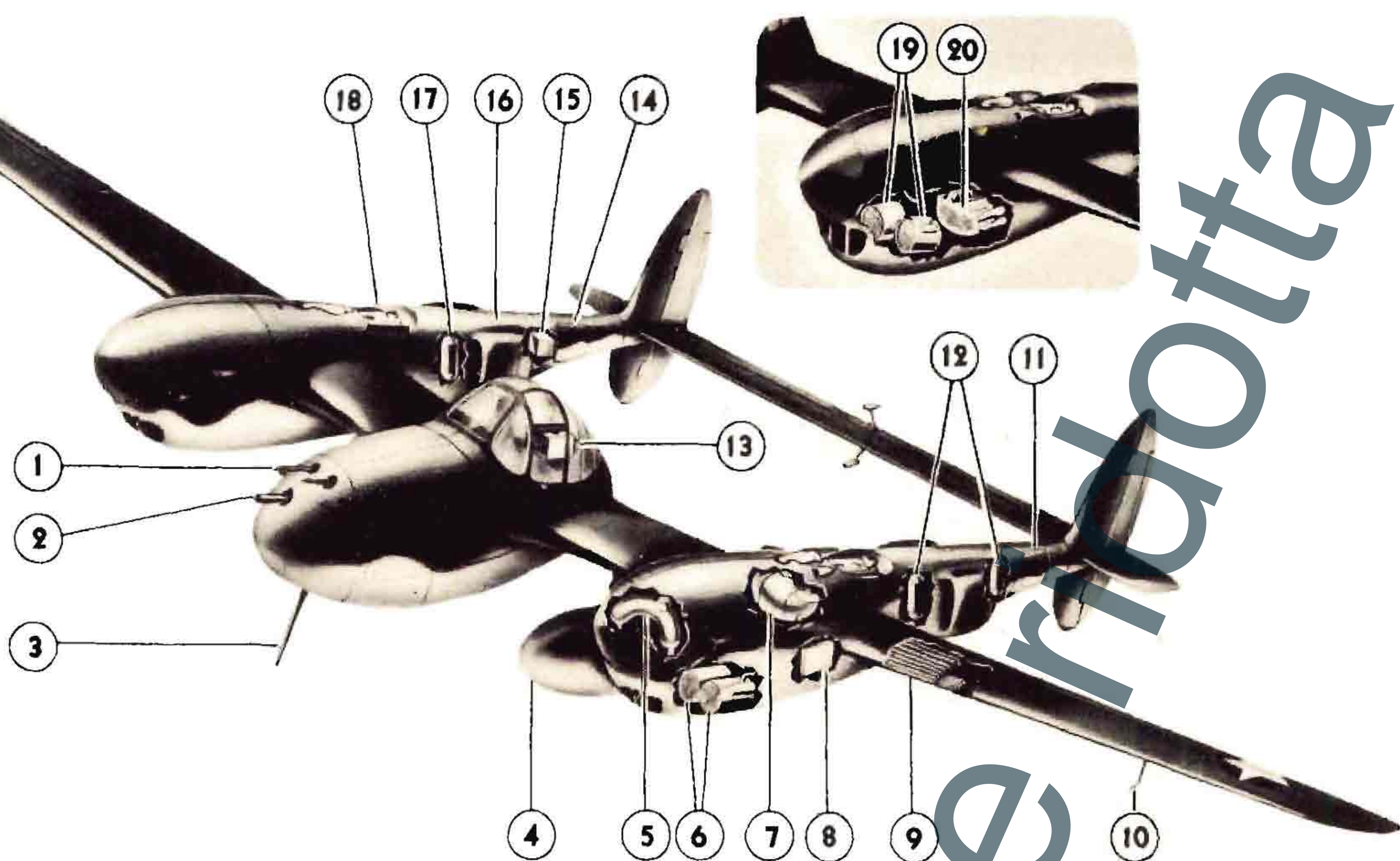


Figure 8 — Airplane Content Diagram

11. MISCELLANEOUS.

a. FIRST AID KIT is located behind the pilot's seat on the right-hand side.

b. VERY PISTOL is carried in the top of the canopy, behind and above the pilot's left shoulder. Cartridges are located nearby.

c. MAP CASE is located behind the pilot's right shoulder.

d. EMERGENCY RATIONS, if any, will be carried in the baggage compartment.

e. INCENDIARY GRENADE is stowed behind the seat of airplanes serial 42-66702 and up. When a forced landing is made in enemy territory, the airplane may be destroyed by throwing the grenade at the airplane from a safe distance.

1. .50 caliber machine guns.
2. 20 mm cannon.
3. Antenna mast.
4. Droppable fuel tank.
5. Coolant tank.
6. Oil cooler radiators (P-38H).
7. Oil tank.
8. Carburetor air filter.
9. Carburetor air intercooler (P-38H).
10. Airspeed pitot.
11. Battery compartment door.
12. Oxygen bottles.
13. Radio equipment.
14. Baggage compartment door.
15. Recognition radio.
16. Coolant radiators.
17. Oxygen bottle.
18. Turbo supercharger.
19. Oil cooler radiators (P-38J and F-5B).
20. Carburetor air intercooler (P-38J and F-5B).

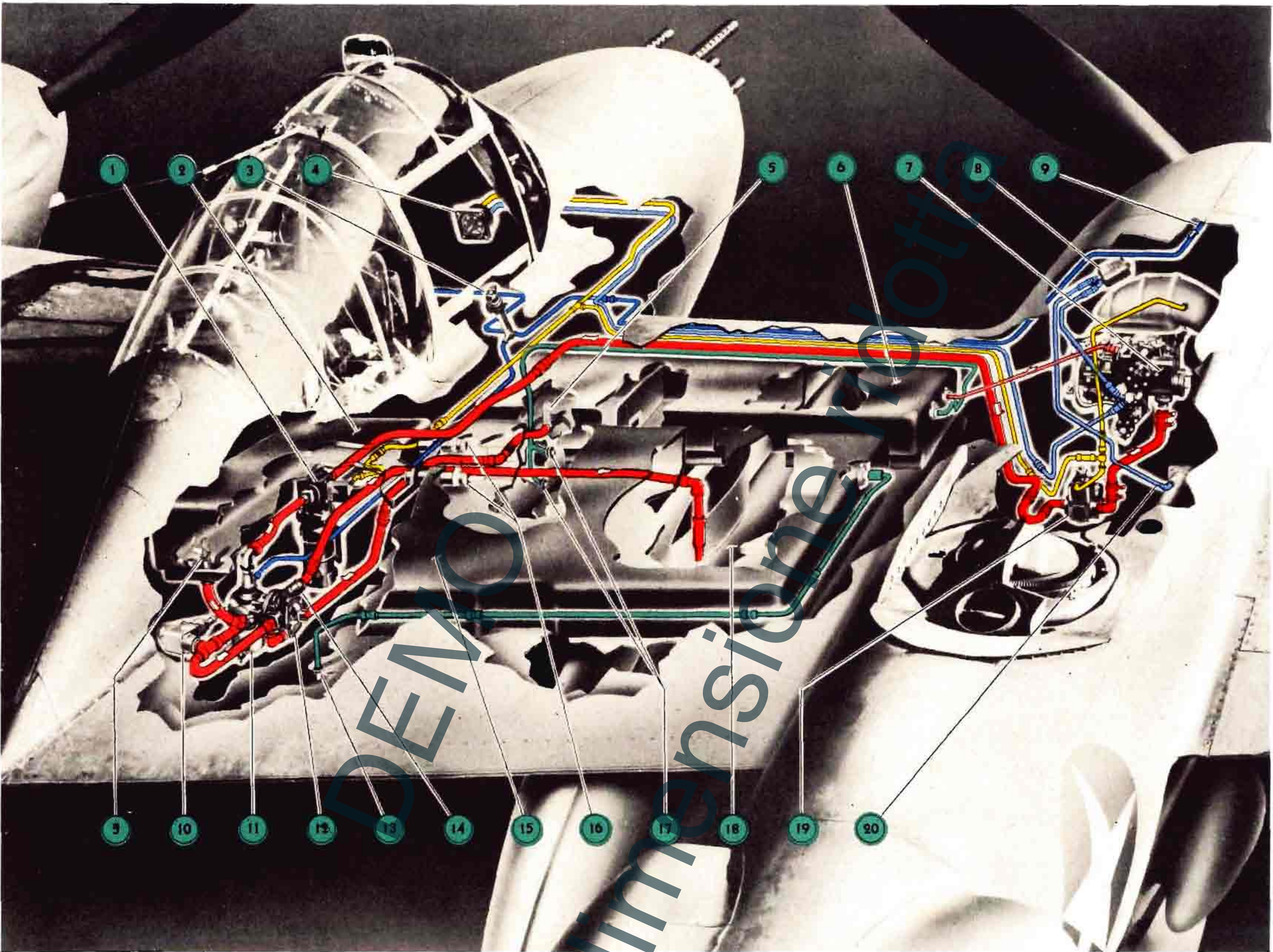


Figure 9 — Fuel System Diagram

KEY TO FIGURE 9 AND 9A

- 11. Fuel filter.
- 12. Tank selector valve.
- 13. Main tank vent.
- 14. Check valve.
- 15. Main tank (capacity 93 U.S. gal., 77 Imperial gal.).
- 16. Passages between main tank and surge tank.
- 17. Reserve tank vent.
- 18. Droppable tank (capacity 165 U.S. gal., 137 Imperial gal.).
Or (325 U.S. gal., 271 Imperial gal.).
- 19. Engine driven fuel pump.
- 20. Oil dilution line (injects fuel into oil system).

- 1. Electric fuel pump.
- 2. Surge tank (considered part of main tank).
- 3. Engine priming pump.
- 4. Fuel pressure gage.
- 5. Outlet from tank.
- 6. Reserve tank (capacity 60 U.S. gal., 50 Imperial gal.).
- 7. Carburetor.
- 8. Oil dilution valve.
- 9. Line to engine primer distributor.
- 10. Crossfeed valve.
- 11. Fuel filter.
- 12. Tank selector valve.
- 13. Main tank vent.
- 14. Check valve.
- 15. Main tank (capacity 93 U.S. gal., 77 Imperial gal.).
- 16. Passages between main tank and surge tank.
- 17. Reserve tank vent.
- 18. Droppable tank (capacity 165 U.S. gal., 137 Imperial gal.).
Or (325 U.S. gal., 271 Imperial gal.).
- 19. Engine driven fuel pump.
- 20. Oil dilution line (injects fuel into oil system).

Main Fuel Lines.

Fuel Pressure Balance Lines.

Engine Primer Lines.

Fuel Pressure Lines.

Vapor Return Lines.
(Approximately 1 qt. per hour.)

Fuel Tank Vent Lines.

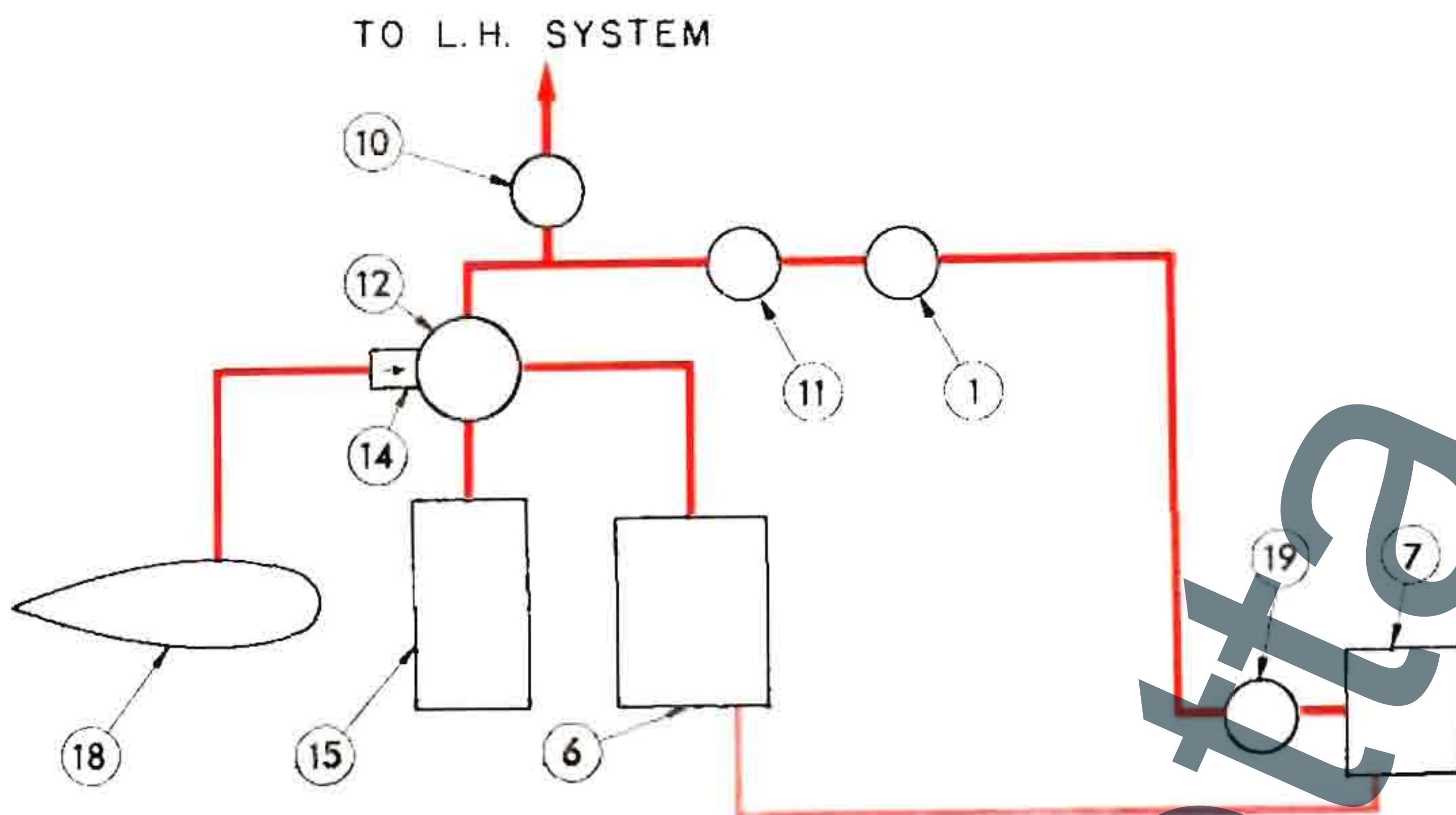


Figure 9A — Simplified Fuel System Diagram

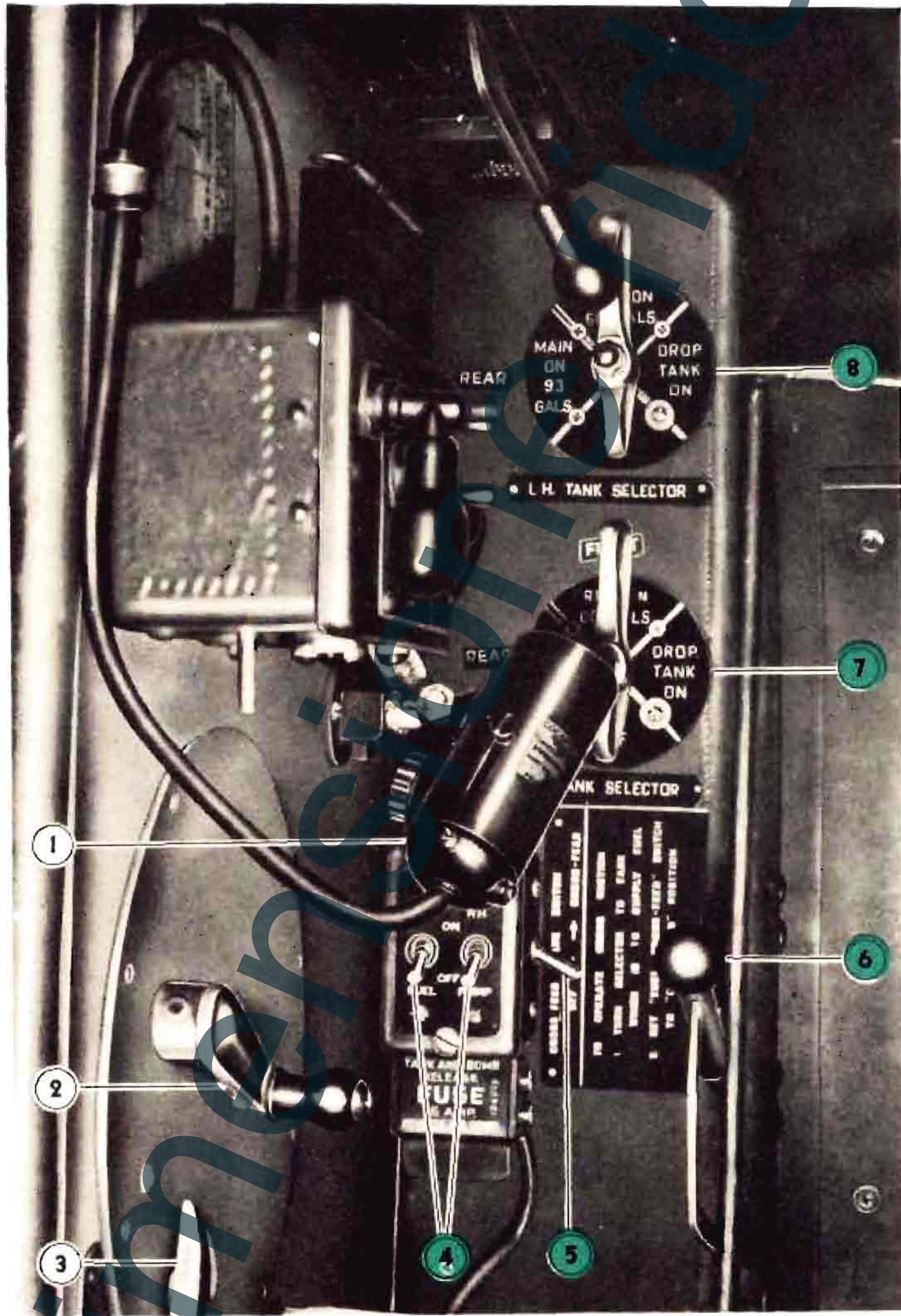
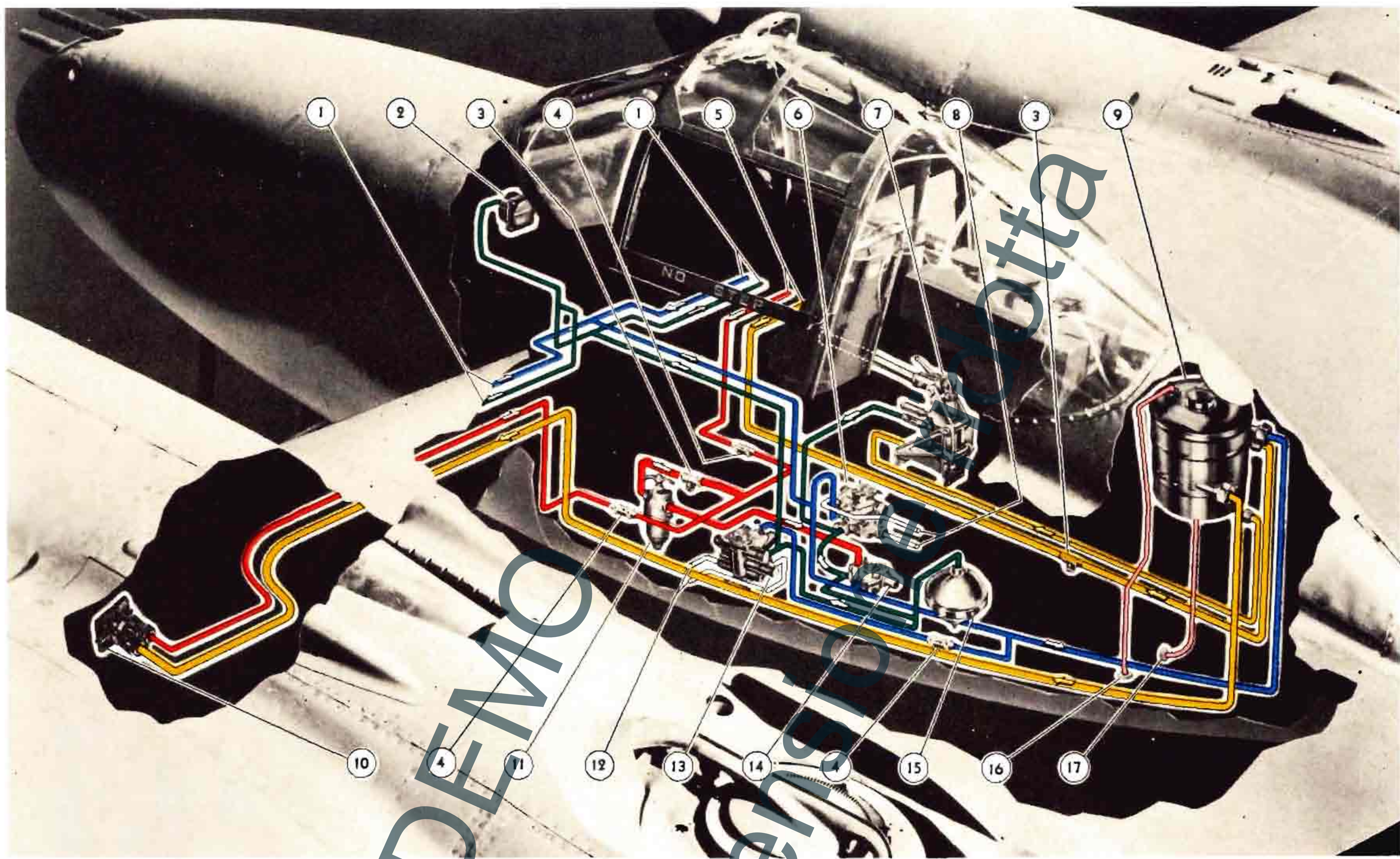


Figure 10 — Fuel System Controls

- 1. Spotlight (in alternate position).
- 2. Left window crank.
- 3. Window crank ratchet handle.
- 4. Electric fuel pump switches.
- 5. Cross feed switch.
- 6. Shoulder harness release.
- 7. Right hand tank selector valve.
- 8. Left hand tank selector valve.



- Pump Pressure.
- Return to Reservoir.
- Pump Suction.
- System Pressure.
- Tank Drain or Vent.

- 1. To coolant flaps (see figure 16).
- 2. Hydraulic pressure gage.
- 3. Ground test connection.
- 4. Check valve.
- 5. To right hand engine pump.
- 6. Flap control valve.
- 7. Emergency hand pump.
- 8. To flap system (see figure 13).
- 9. Main hydraulic reservoir.
- 10. Engine driven pump.
- 11. Hydraulic fluid filter.
- 12. To landing gear (see figure 13).
- 13. Landing gear control valve.
- 14. System pressure regulator.
- 15. Hydraulic pressure accumulator.
- 16. Vent to atmosphere.
- 17. Main reservoir drain.

Figure 11 — Basic Hydraulic System Diagram